



UNITED STATES NAVY

## MEDICAL NEWS LETTER

## Surgeon General's Christmas Message December, 1959

*"For it is in giving . . . that we receive"*  
From the prayer of St. Francis of Assisi

To our Medical Department family and friends, it is my privilege and pleasure to say again, "Well Done! And may you have a Holy Christmas and a Happy New Year."

In the year just passed, we have continued to do our part helping to bring the gift of health to those who defend the nation, and to their families. Their need has been our primary concern, and their welfare continues uppermost in our thoughts and all that we do.

In the spirit of this Holy Season, I send you greetings and ask that you join me in a simple prayer that we may give unstintingly of ourselves and of our capabilities to the men and women of the Navy and Marine Corps and thus to the service of our God and our Country.

*B. W. Hogan*  
B. W. HOGAN

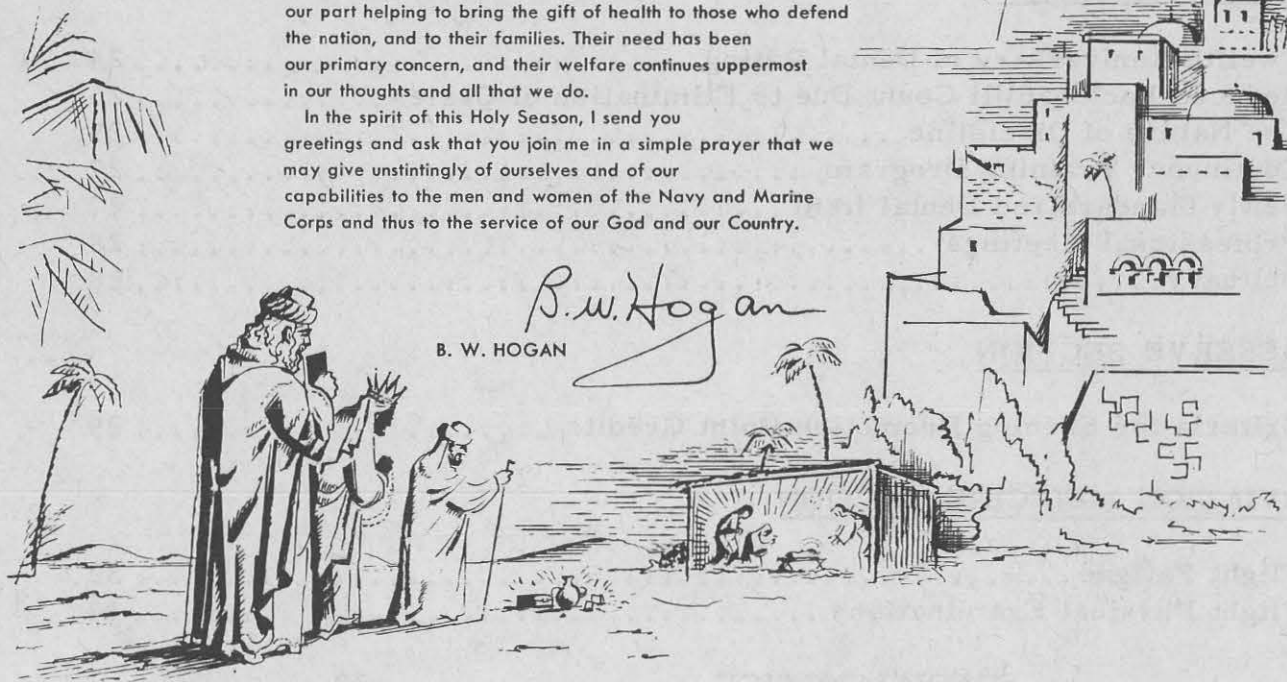


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### Changing Views on Heart Failure

The total picture of cardiac failure, with consequent dyspnea and edema as major manifestations, is one of considerable complexity. Accurate methods of cardiac output determination put an end to many speculative hypotheses. When the organism requires a high output, as in anoxic and anemic states, the overworked heart may go into failure. The switch of emphasis from output to work enables appreciation that every failing heart is an overloaded heart. The overload may result from narrowed or incompetent valves, elevated pressure head in the systemic or pulmonary arteries, or inadequate muscle reduced either in its anatomic bulk by ischemic scarring or more subtly damaged by rheumatic inflammation.

These factors will affect the heart at rest, but what happens on exercise must be considered when additional stimuli whip the heart to greater effort. The pump is driven at an increased rate, it ejects more blood at each beat, possibly responding to increased secretion of adrenalin. These mechanisms tend to supersede and obscure the simple working of Starling's law in normal animals and man. In the diseased or embarrassed heart, excessive tachycardia develops with relatively minor activity, but it is in the later stages that the heart loses its flexibility, the resting rate in failure with sinus rhythm settles to around 90 to 100 per minute, and the heart ceases to respond to the other finely adjusted physiologic mechanisms. At this stage, an elevated venous pressure may make its appearance.

Starling demonstrated a steadily rising cardiac output response as the venous filling pressure was elevated, but this response flattened out and a falling output reaction developed as the filling pressure was raised beyond a certain limit. It is this descending limb of the Starling curve which seems to correlate so closely with many observations in human heart failure.

Facts which have been demonstrated in man include:

1. Rapid transfusion in the anemic heart will precipitate failure.
2. Exercise will often elevate venous pressure, but output of the heart may actually fall.
3. Venesection frequently increases cardiac output.
4. Mercurial diuretics, by decreasing blood volume, lower venous pressure and often increase cardiac output.
5. Physical rest has the converse effect of exercise, dropping venous pressure and increasing output.
6. Output of the heart in hypertensive failure will increase when venous pressure and arterial resistance are reduced by hypotensive drugs.

It bears emphasizing that diuresis is a potent method of reducing venous pressure with corresponding hemodynamic improvement. The rapid loss of fluid by the kidney depletes the vascular fluid compartment substantially—an effect comparable to venesection.

Formerly, it was imagined that the falling part of the Starling curve was in some way related to overstretching of myocardial fibers. Quick recovery which



could take place during venesection led to the conclusion that the damage was not irreparable, and that it was more likely to be mechanical than due to any profound metabolic breakdown.

A major part of therapeutic effort in heart disease consists of attempts to remove the extra load imposed on the heart. In addition to such medical measures as digitalis, rest, diuretics, and reduced sodium intake, the surgeon can aid by breaking adherent valves. Crude though his methods may be, the surgeon gives promise of more profitable results as the techniques for open heart surgery are improved. Nevertheless, the bulk of heart disease will long remain strictly in the realm of the physician.

Improvements in management of bronchitis, asthma, emphysema, hypertension, and other conditions imposing an extra load on the heart will add to the increasing success in treatment of heart failure.

Dynamics of early left ventricular strain are matters of great moment. One interesting manifestation is the development of an auricular gallop sound. This sound is related to the end of inflow from the atrium into the ventricle, and its presence means that auricular filling is terminated; the resulting sound is created either by distention of the ventricular wall or by an upward movement of the mitral valve cusps. Taking the load off the left ventricle will cause regression of this sound with a migration to the first sound before fusion with that sound.

These phenomena, together with appearance of an atrial sound, in ischemic heart disease indicate the importance of this physical sign in judging the imminence of more severe failure. A full appreciation of its meaning will add greatly to the understanding of that condition.

The mode of action of digitalis is still perplexing. Its action is most often demonstrable in left ventricular failure, particularly in hypertensive or ischemic heart disease. It is almost impossible to predict the metabolic state of the heart on which digitalis may exercise its action. Every time it is given, its administration is something of an experiment.

Recently, it has been shown that during attacks of anginal pain, pulmonary vascular pressures are usually elevated. Relief of angina by nitroglycerin is accompanied by corresponding relief of pulmonary hypertension. Thus, that left ventricular failure is a common accompaniment of anginal pain is apparent. It is worthwhile to find out if shortness of breath is a component of anginal discomfort. Where it is present, digitalis administration may be of value in reducing frequency of attacks.

Progress in understanding the behavior of the failing heart is being made, and efforts in treatment have become more logical. (McMichael, J., Changing Views on Heart Failure: *Ann. Int. Med.*, 51: 635-640, October 1959)

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### Diffuse Myocardial Fibrosis

Myocardial fibrosis is defined as a diffuse replacement or invasion of the myocardium by fibrous connective tissue to such an extent that there is interference with the action of the heart. It may be expected that the nature, location, and extent of such fibrosis will influence its manifestations in a given patient. Probably the most frequent cause is coronary artery disease, but many other diseases, diffusely involving the myocardium, also can result in myocardial fibrosis.

Approximately 25 years ago, chronic myocarditis or myocardosis was a popular and frequent diagnosis. It was defined as a lesion in which cardiac failure was associated with normal valves and pericardium while the heart muscle showed hypertrophy alone or in combination with fibrous interstitial myocarditis. Subsequent work established that most of these patients had either hypertensive or coronary artery disease as a cause of their cardiac failure.

The authors' study of 14 patients having myocardial fibrosis which presents symptoms suggesting constrictive pericarditis, defines features of differential diagnosis.

In general, these patients with diffuse myocardial disease and without pericardial disease presented themselves with the manifestations of intractable heart failure. There was usually a definite onset in time. No patient had clear evidence of valvular disease or hypertension. Phenomena usually observed were: (1) elevated venous pressure, (2) congestive hepatomegaly, (3) ascites, (4) peripheral edema, (5) cardiomegaly, (6) distant heart sounds, (7) diastolic gallop, (8) diminished fluoroscopic cardiac pulsations, (9) signs of peripheral congestion more pronounced than those of pulmonary congestion, (10) ECG with low voltage and nonspecific T-wave changes, and (11) disappointing response to usual treatment for congestive heart failure.

One of the most characteristic findings in patients with diffuse fibrosis or constrictive pericarditis is an intractable course resistant to treatment. Nothing about the course can serve to differentiate one from the other.

History of an original injury to either pericardium or myocardium—acute pericarditis or myocardial infarction—may be significant. The weight one gives to this evidence depends on thoroughness of documentation.

Pulsus paradoxus may occur in both conditions, but in the experience of the authors, it has been more frequent and impressive in patients with constrictive pericarditis.

Characteristic calcification involving the pericardium, usually present in some 50% of patients with constrictive pericarditis, is evidence in favor of that disease, although its absence is not conclusive. Furthermore, intravascular pressures are not specifically diagnostic.

It is apparent that neither physical findings, course, nor catheterization measurements permit differentiation between myocardial fibrosis and pericardial constriction. Because these disorders affect cardiac hemodynamics in an

identical fashion, it is to be expected that their signs and symptoms should be virtually identical. In many patients, this difficult differential diagnosis can only be resolved by direct inspection of the heart. (Burwell, C.S., Robin, E.D., Diagnosis of Diffuse Myocardial Fibrosis: Circulation, XX: 606-614, October 1959)

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### Radioiodine in Treatment of Hyperthyroidism

The authors add experience gained from 294 patients to that accumulating in medical literature in relation to treatment of hyperthyroidism with radioactive iodine. Details of diagnosis and treatment of these patients over a 7-year period is included.

The oldest patient was 78; the youngest, 16; and 86 patients, or 29%, were below the age of 40. The authors consider that the early fear that cancer might be produced by radiation from  $I^{131}$  has not materialized, and that one must weigh the theoretical risk inherent in the use of ionizing radiation against the risk of any other modality of treatment. To date, no authentic instance of thyroid cancer developing as a result of  $I^{131}$  therapy for hyperthyroidism has been published. The incidence of leukemia has been shown to be no greater than in the general population. Furthermore, the comparatively tiny dose of radiation received from blood-borne  $I^{131}$  following therapy of hyperthyroidism apparently exerts no deleterious effect of gene mutation of gonads.

Ninety-five patients presented thyroid glands that were not palpably enlarged. Diffuse goiter was seen in 193; nodular toxic goiter was present in 71 patients. No previous antithyroid treatment had been given to 176 while propylthiouracil had been given in varying doses and for periods up to 2 years to 43 patients.

Diffuse toxic thyroid was made to regress with relatively small doses of radioiodine, and approximately two-thirds of the total cases were controlled by a single dose. Two-thirds of the remaining cases were controlled by a second dose; two-thirds of this remainder needed a third dose; and two-thirds of this remainder needed one more dose. In other words, a patient stood a 2:1 chance of being controlled by any individual dose, with diffuse goiters doing somewhat better than nodular. It is interesting to note that 88% of all patients with diffuse and nodular enlargement were controlled by one or two doses.

The experience of the authors corroborates experience of others that improvement, if it occurs, is often quickly evident. In 63%, a positive response, judged by clinical signs and symptoms and by  $I^{131}$  uptake and saliva count, was already evident by the end of the third month after the therapeutic dose. The patient who manifested slow improvement was watched for a period up to 6 months before a second therapeutic dose was given. However, if toxicity was still severe at the end of 3 months, additional therapy was considered.

The patients followed in this series maintained remissions for periods up to 7 years. The toxic thyroid patient controlled for one year rarely showed recrudescence.

In this study, 81 cases of exophthalmos of various grades of severity were noted with improvement in 48%, no change in 50%, and moderate aggravation in 2%. To date, initial appearance of exophthalmos after a maintained remission has not been observed.

End results indicate clinical remission in 93% of whom 85% were made euthyroid and 8% hypothyroid. In successful therapy of hyperthyroidism with  $I^{131}$ , as with surgery, a certain percentage of hypothyroidism is inevitable. The 24 patients who became hypothyroid were, therefore, included as successes.

In a group of 80 patients given strong iodine solution beginning 24 hours after treatment dose of radioiodine, the half-life of radioactive material and ultimate clinical response were not altered, compared to those not receiving it.

The change in size of the enlarged thyroid gland parallels clinical response. Many nodular goiters will completely regress, although some residual nodularity is a more common result.

Eighteen patients developed hypothyroidism within one year and 6 developed it subsequently. To date, no patient has become hypothyroid after 3 years of remission. No correlation was found between the induction of hypothyroidism and dose range or age of the patient.

Four patients experienced transient thyroiditis manifested by pain and tenderness over the thyroid gland and slight fever within 2 weeks after administration of the radioiodine. One case of thyroid crisis with ensuing death occurred in a severely toxic girl 16 years of age. (Rubinfeld, S., et al., Radioiodine in the Treatment of Hyperthyroidism - A Seven-Year Evaluation: A.M.A. Arch. Int. Med., 104: 532-538, October 1959)

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#### Roentgenographic Findings in Complications of Diabetes Mellitus

Few diseases definitely associated with one organ and one metabolic function have such widespread concomitant pathologic changes as does diabetes mellitus. The protean nature of this disorder has been appreciated clinically for many years and there have been many reports in radiologic literature concerning particular aspects of these pathologic changes. Certain roentgen changes are almost pathognomonic and other changes occur with such frequency as to be highly suggestive of the disease.

Of 672 cases of diabetes mellitus occurring over a 3-year period, 177 patients were examined roentgenographically with a total of 547 different examinations. From these examinations, roentgenographically evident lesions encountered in diabetes mellitus were obtained.



Genitourinary System. Necrotizing renal papillitis is found only in cases of diabetes mellitus or in obstructive uropathy with secondary infection. Therefore, in the absence of the latter, its presence should suggest the diagnosis of diabetes mellitus. This process goes through various stages with the end result of club-like fossa and, sometimes, incrustation by calcium salts.

Gas-forming infection in the perirenal tissues is the next common complication. Escherichia coli is nearly always the causative agent. Multiple small bubbles of gas in the perirenal area are quite characteristic in appearance. Gas-forming infections of the bladder are also a fairly frequent occurrence. Cystitis emphysematosa is recognized by a halo of gas about the bladder shadow. The condition almost invariably occurs in diabetics, but may be transient and thereby go undetected. The blebs are recognizable on cystoscopic examination as well as roentgenographically. Primary pneumaturia is also found, but usually as a complication of neurogenic bladder secondary to diabetic neuropathy. In these cases, examination for urine sugar may be negative due to utilization of the sugar by bacteria.

Diabetes mellitus may sometimes be the underlying disease in neurogenic bladder dysfunction—so-called "cord bladder"—manifested roentgenographically by a large bladder size and reflux of opaque material into the ureters which are also large in caliber. Calcification of the vas deferens and seminal vesicles has been described on the basis of pathologic observations, but this finding was not encountered roentgenographically in the present series of cases.

Adenocarcinoma of the corpus uteri may also be related to diabetes mellitus in that its frequency of occurrence is increased. This complication may prove of concern to the radiologist as a therapeutic problem.

Gastrointestinal System. In review of 72 cases of diabetes mellitus with dysphagia, 10 examples of ripple esophagus were found. A neuromuscular dysfunction found most frequently in elderly people, this condition may represent nerve degeneration in a diabetic. When encountered in a relatively young person, the possibility of diabetes mellitus as a cause for the dysfunction should be considered.

Acute dilatation of the stomach is a frequent finding in diabetic acidosis. The dilatation promptly returns to normal with control of the diabetes. Diarrhea, likewise, occurs frequently in diabetics, being due to hypermotility of the small intestine.

Of diabetic abnormalities of the pancreas which may produce roentgen findings, pancreatitis, either acute or chronic, is most common. In the acute stage there may be evidence of multiple small bubbles of gas in the region of the pancreas—almost invariably a complication of diabetes mellitus. The calcific stage of pancreatitis may also be evident roentgenographically. Cysts or pseudocysts of the pancreas may be associated with diabetes and may be another manifestation of chronic pancreatitis. It is of interest that the incidence of carcinoma of the pancreas is strikingly increased in diabetes mellitus.

Gas infection of the gallbladder is occasionally noted in diabetes mellitus. The infection may cause emphysematous changes in the wall of the gallbladder or may fill the gallbladder itself with gas. The subject of incidence of cholelithiasis and cholesterosis has been debated at great length, with no specific conclusions, and study of the present series resulted in no definite opinions or findings.

Skeletal System. Changes in the skeletal system secondary to diabetes mellitus are ascribed to three causes—neuropathy, avascular necrosis, and osteomyelitis. Diabetic Charcot joints, identical with that of Charcot joints of other etiology, exhibit fragmentation, eburnation, absorption of articular surfaces, loose bodies in the joint, and calcific deposits in the synovial membrane. The ankle is the most frequently involved joint, with tarsal and metatarsal articulations being the second most frequently involved sites.

A far more frequent occurrence is presence of avascular necrosis. The earliest roentgenographic finding in this condition is demineralization of a spotty variety, frequently followed by resorption of the tufted end of the terminal phalanges. At the stage of resorption of bone, frank gangrene is present in soft tissues. Osteomyelitis which follows is frequently accompanied by a gas-forming infection in adjacent soft tissues.

Nervous System. Probably the most common abnormality of the nervous system in diabetes mellitus is the so-called diabetic neuropathy. The theory of etiology with the most proponents is that it is due to arteriosclerotic changes in the vasa nervorum. Roentgenographic findings are dependent upon which organ is supplied by the affected nerve. Charcot joints, tabes diabetica, functional abnormalities of the esophagus, and cord bladder are some of the manifestations of neuropathy that are evident roentgenographically as abnormalities of the organ supplied by the affected nerve. Nonspecific changes in various organs should be kept in mind, recognizing diabetes mellitus as a possible etiologic agent.

Acromegaly, a disease due to eosinophilic adenoma of the pituitary in which diabetes mellitus is sometimes found, exhibits characteristic roentgenographic changes.

Cardiovascular System. Pathologically, arteriosclerotic changes observed in diabetes are not characteristic of the disease. However, it has been noted that intimal thickening and deposition of cholesterol crystals are found in elastic vessels and that calcification of the media is seen primarily in muscular vessels. It is a fairly frequent occurrence to observe in the 30 to 50-year age group extensive calcification of the vessels of the feet with little or no calcific deposits in the aorta. Extensive calcification of pedal vessels is seldom observed in diseases other than diabetes mellitus in patients under 50 years of age.

Skin. There may be amorphous deposits of calcium in the skin and subcutaneous tissue in cases of diabetes mellitus, although they were not recognized in the present series.

Lungs. Two pulmonary abnormalities are encountered in diabetes mellitus with increased frequency—hyaline membrane disease and pulmonary tuberculosis. The former occurs in 16% of infants of diabetic mothers; the latter has been occurring with decreasing incidence, although the decrease has not been as rapid as the decrease of tuberculosis in the general population.

Diabetes mellitus is not often regarded as a disease which requires roentgenographic confirmation. Its complications, however, can frequently be diagnosed by roentgenologic means. (Beck, R. E., Roentgenographic Findings in the Complications of Diabetes Mellitus: Am. J. Roentgenol., 82: 887-896, November 1959)

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#### Rehabilitation of the Bladder in Injuries of the Spinal Cord

In the hours immediately following trauma to the spinal cord the physician works energetically to save life. The tremendous disturbance of the patient's central nervous system necessitates that energetic care continue beyond the immediate life-saving stage. Of all problems that exist, care of the urinary system is one of the most important.

In one instance, review of autopsy findings of paralysis patients revealed that renal disease was the most common primary pathologic diagnosis, while genitourinary disease was present in 90%. Better renal function had occurred in the absence of catheter drainage.

In treating the paraplegic patient, the ultimate goal is to obtain as soon as possible a functioning bladder characterized by: (1) catheter-free existence, (2) adequate capacity with negligible residual urine, (3) socially acceptable urination, and (4) absence of infection.

In order to approach the problem of bladder rehabilitation logically, knowledge of the neurogenic mechanisms of the bladder is required, review of which is presented by the authors. After analysis of the neurologic deficit, specific corrective procedures may be employed to facilitate establishment of acceptable bladder function.

Care of the genitourinary tract begins on the first day of admission. Dangers of inadequate care are emphasized to the patient—his cooperation is essential. A fluid intake of 240 ml. (full glass) every hour from morning until bedtime is established immediately to provide an intake of at least 3,000 ml. daily. The indwelling catheter is attached to continuous drainage, and the bladder is irrigated four times a day with sterile saline. To avoid distention, continuous drainage is maintained during the so-called atonic phase when detrusor contraction is absent.

When detrusor activity appears, tidal irrigation, catheter clamping, or both, may supplant continuous drainage in selected patients. If a patient



is aware of vesical contractions and can immediately institute drainage, the urethral catheter may be clamped. Tidal drainage is effective as an irrigator and in increasing the capacity of the small irritable spastic bladder.

Excretory urography and retrograde cystourethrography are done early and repeated as necessary. Cystoscopic examination together with other urological procedures are performed as indicated.

Return of detrusor activity is determined by retrograde cystometry. This is performed every 3 to 4 weeks until detrusor activity is apparent. When it returns, the catheter is removed. If a high residual urine is present, catheter drainage is reinstituted and additional voiding trials are made at two-week intervals. If detrusor activity is adequate but voiding is not, sphincterometry may be useful.

After the catheter is removed, the patient voids at scheduled times. The schedule is subsequently adjusted to correspond with rate of urine production while still maintaining high fluid intake. Capacity is best determined from amounts voided plus residual rather than by retrograde filling.

Infection appears rapidly after initial catheterization and urine rarely becomes sterile even after the patient becomes catheter-free. Long-term antibacterial medication is indicated to control infection. The broad spectrum antibiotics are usually reserved for acute febrile urinary infections.

In order to reduce incidence of calculi, this regimen is followed: (1) fluid intake of at least 3,000 ml. daily, (2) maintenance of acidity of urine, (3) catheter changes weekly or oftener if encrustation occurs, (4) elimination of milk from diet, (5) aluminum gel (30 ml.) 4 times a day—with meals and at bedtime—to reduce phosphaturia, and (6) oral administration of salicylates because they are excreted as glucuronide complexes which increase the solubility of calcium salts.

How long to wait for adequate reflex elimination to develop before intervening is a difficult question. A fair standard is either 6 months after injury, or 2 to 4 months after appearance of detrusor contraction, whichever occurs later.

Within the framework of a small hospital center with frequently changing staff, the author developed the outlined schedule of rehabilitation. Of 59 patients undergoing this rehabilitation, 64% became catheter-free. Men did slightly better than women; and patients with autonomous bladders had a greater conversion rate than did those with reflex bladders. The average length of time after injury for the patients to become catheter-free was seven and one-half months. Patients with upper motor neuron lesions converted in 6 months and those with incomplete lesions in 3 months. Ischemic ulcer was the major cause of failure to attain a catheter-free status and vesical lithiasis was the most frequent urinary tract complication.

Although adequate function may develop in the cord bladder, there is no guarantee that it will continue; therefore, protracted follow-up is essential. Renal lesions, especially calculi, may occur in spite of adequate drainage or

physiologic emptying of the bladder. Important as are the first 6 months after injury, long-term care is equally necessary if morbidity and early death from renal disease are to be avoided. (Stolov, W.C., Rehabilitation of the Bladder in Injuries of the Spinal Cord: Arch. Phys. Med., 40: 467-474, November 1959)

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### Postoperative Nasal Gastric Suction

Gastric suction has been of tremendous benefit in treatment of certain gastrointestinal diseases. This fact has led to its widespread utilization, especially postoperatively during the period of relative ileus. However, reports have indicated that serious complications can occur from the presence of an indwelling gastric catheter, and that after an uncomplicated laparotomy, routine insertion of a nasal-gastric tube is inadvisable. This conclusion is based on the fact that a relatively small amount of gastric fluid withdrawn through an indwelling tube can be readily absorbed by the postoperative gut even in the presence of ileus, and air ingestion is minimal if fluids are withheld.

A fasting volume of saliva and gastric fluid is continually secreted, the average quantity of each being about 1 liter, with wide variations. In the normal fasting state this fluid is passed readily and immediately into the small bowel where it is reabsorbed. An indwelling gastric tube is able to capture only a portion of this fluid as it passes through the stomach.

The amount of air swallowed in the fasting state and during fluid intake has not been determined. Observations of the authors indicate that little air is swallowed in a fasting state, but that with ingestion of liquids, swallowed air is greater in quantity than the fluid intake regardless of the manner of taking the fluids.

Two small groups of patients were studied. One group was intubated, and fluids were restricted; the other group was also intubated and water intake was allowed and encouraged. When oral intake was withheld, drainage amounted to approximately 600 ml. of gastric fluid and 2,000 ml. of air in each 24 hours. Quantitative determinations of sodium content of the aspirated fluid revealed that an average of 42 mEq. was lost each 24 hours. Average chloride content each 24 hours was 70 mEq. Total electrolyte losses were not of a large magnitude and would be replaceable by an infusion of approximately 500 ml. of physiologic saline.

In the group that received oral fluids, total fluid aspiration indicated minimal stimulation of gastrointestinal secretion by fluid ingestion. Electrolyte loss was increased somewhat—particularly sodium—although the total loss was insignificant. The volume of air trapped was considerably greater in the group allowed fluids, averaging 1.3 ml. of air recovered for each ml. of water taken. These findings demonstrate vividly that air ingestion is a major factor when large volumes of fluid are allowed.

Although the need for gastrointestinal decompression is the primary consideration in tube usage, it is not the only one. Considerable discomfort accompanies maintenance of gastric intubation. Approximately 75% of patients studied by the authors had distress from the tube, and sore throat and thirst paralleled in intensity tube discomfort. There was no significant difference in thirst and tube discomfort when comparing patients on fluid intake with those receiving nothing by mouth. Sore throat was significantly more frequent in the fasting group, probably a reflection of the constant dryness of the oral and pharyngeal mucosa. Despite tube insertion, 45% had some nausea, and 20% vomited while the tube was in place.

While conditions are not completely comparable with nonintubated patients, it appears that the average person taking no fluids postoperatively swallows approximately 2 liters of recoverable air and accumulates in the stomach about 600 ml. of recoverable salivary and intestinal secretion each day. With increasing oral intake, considerable air and fluid can be accumulated. Somewhere, a point of decompensation is reached, dependent on the degree of ileus present. However, the additional liter of fluid and air accumulated by the drinking of 400 ml. of water would probably cause no severe distress, while the water intake would improve morale and tend to prevent soreness and dryness of the throat.

The unintubated postlaparotomy patient taking small amounts of fluid by mouth will have less fluid and electrolyte loss, less chance of respiratory infection or other tube complications, be more comfortable, and be more easily ambulated. (Mehnert, J.H., et al., A Clinical Evaluation of Postoperative Nasal Gastric Suction: Surg. Gynec. & Obst., 109: 607-612, November 1959)

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### Carcinoma of Corpus Uteri

Carcinoma arising in the endometrium is the second most frequent malignant tumor to develop within the genital organs of women. There is mounting evidence that there is an absolute increase in the incidence of neoplasm of the corpus uteri. An investigation in Stockholm of the cause of postmenopausal vaginal bleeding indicates that 6 out of 10 patients who consult a doctor because of spontaneous bleeding 2 years or more after the menopause have a malignant tumor of the pelvis. In the years 1948 through 1951, the author saw 617 patients with primary carcinoma of the endometrium.

In spite of these facts, delay in diagnosis of the carcinoma is formidable. In propaganda for early diagnosis, teaching of physicians is still important.

Carcinoma of the corpus is often accompanied by degenerative cardiovascular disease, essential hypertension, obesity, diabetes, and/or other endocrine abnormalities. These and other facts justify the suggestion that



endocrine factors play a part in pathogenesis of endometrial carcinoma. Other features of pathogenesis of this carcinoma are variable and uncertain with many proposed theories.

Primary carcinomas of the corpus are generally adenocarcinomas. In the author's experience, a pure solid carcinoma was encountered infrequently, and mixed tumors were rare.

In general, curettage is required to establish the diagnosis. An endometrial biopsy is of value in the early diagnosis as it can be performed on an ambulatory basis. The diagnosis of an adenocarcinoma from curettings is sometimes difficult. Prior to administration of therapy, information must be obtained on the extent of the carcinoma to the isthmus and cervix. In most instances, a fractional curettage facilitates the estimation of the extension of the carcinoma.

Sometimes, clinical examination or differential curettage does not give sufficient information regarding the location of the carcinoma. If so, hysteroscopy or hysteroradiographic examination with water-soluble contrast medium is imperative prior to any kind of therapy. Some authorities have stressed the value of the x-ray examination prior to curettage in every instance of postmenopausal hemorrhage. The author does not like to do it routinely because he considers that it may increase the risk of infection and spread of the cancer. Special x-ray studies, such as arteriography or venography, or parametriography are of value in selected cases of carcinoma of the endometrium associated with another growth in the pelvis.

Present international clinical classification recommends division of carcinoma of the endometrium into carcinoma of the corpus, and carcinoma of the corpus and endocervix. A subgrouping of the carcinoma into two stages with regard to clinical findings prior to treatment is recommended. Because carcinoma of the corpus frequently occurs in patients with severe cardiovascular disease or obesity, it has been recommended that Stage I be separated into two groups—those clinically operable and those clinically inoperable. The need for this subdivision depends on the skill and experience of the operator and the surgical team available.

Types of treatment are total hysterectomy by the abdominal or vaginal route, radical hysterectomy, radiotherapy, or a combination of radiotherapy and operation. Radical hysterectomy with lymphadenectomy only may be the treatment of choice in cases of carcinoma of the endometrium with extension to the isthmus or cervix. The author advocates use of radium as a prophylactic postoperative procedure, and employs irradiation more generally than most clinics.

The "packing" technique employed since 1936 is described. The principle is to fill the uterine cavity satisfactorily with radium tubes and thus decrease the distance from radium to neoplasm. Recently, in addition to irradiation patients of good operative risk are referred to surgery 6 weeks after completion of radiotherapy. (Kottmeier, H.L., *Carcinoma of the Corpus Uteri - Diagnosis and Therapy*: Am. J. Obst. & Gynec., 78: 1127-1140, November 1959)

Vaccine for Trachoma  
Developed at NAMRU-2, Taipei

A United States Navy medical research unit in the Republic of China, working with Chinese physicians, has developed a vaccine which may play a significant role in halting spread of trachoma, an infectious eye disease affecting more than 400 million people.

This announcement was made recently in Washington, D. C. and in Taipei, Taiwan by RADM Bartholomew W. Hogan, Surgeon General of the Navy, and Dr. J. Thomas Grayston, Assistant Professor of Medicine at the University of Chicago, who is now on the staff of Naval Medical Research Unit No. 2 in Taipei.

Dr. Grayston told the story of a year's work by three American and two Chinese physicians at the annual meeting of the Formosan Medical Association in Taipei. The Chinese physicians are Y.F. Yang, Professor of Ophthalmology at the National Taiwan University College of Medicine in Taipei, and S.P. Wang of Taipei, a member of the U.S. Navy medical research unit staff. The American physicians—R.L. Woolridge of Lake Bluff, Ill., and P.B. Johnston of Chicago—are attached to the unit commanded by CAPT R.A. Phillips MC USN.

The group has successfully isolated several strains of trachoma virus, reproduced the disease in human beings, and developed a vaccine safe for human use. Scientists previously had isolated the trachoma virus in other countries, but there have been no other reports on a successful vaccine. Dr. Grayston was reluctant to make predictions as to the ultimate success of the vaccine. He did admit, however, that tests conducted to date were encouraging and that the trachoma vaccine had tremendous potential as a preventive and possibly a curative measure of the illness which often results in total blindness.

The medical unit's studies began in October 1958. The first step was to isolate trachoma virus. By cultures in chicken egg embryos at the NAMRU laboratories, Dr. Wang ultimately isolated five viruses thought to be the cause of trachoma. The next step was to determine if these virus strains would reproduce trachoma. Initial experiments with monkeys produced an infection which resembled the early stages of the human disease, but did not progress to formation of scar tissue. Because the World Health Organization's expert committee on trachoma requires that a virus must reproduce trachoma in human volunteers before it can be accepted as the cause of the disease, it was necessary to obtain volunteers for subsequent tests.

Realizing the potential importance of the tests, six students and one instructor of the Taipei Blind and Mute School volunteered for the next phase of the studies. Four volunteers were given trachoma virus in various dilutions, and three received control material. The virus, even when diluted 10,000 times, promptly produced infection in the human eye. None of the controls contracted the disease.

Dr. Woolridge, an immunologist, immediately attempted preparation of an effective vaccine, using monkeys as test animals. Several vaccines were prepared which produced increase in antibody titer to the parent virus strain and protected the monkeys against infection. The investigators gave the vaccines to themselves and demonstrated that side reactions were no more severe than from commonly used vaccines.

In order to test the effectiveness of the vaccine, volunteers were needed once again. The entire freshmen class at the National Defense Medical College at Taipei—150 students—responded to the need. All ultimately received two doses of the vaccine without adverse reaction. These studies demonstrated that the vaccine produces antibodies against the virus, an encouraging finding since the natural disease produces antibodies only irregularly.

Moving still farther afield, the group is now studying the protective and curative value of the vaccine in 450 children. Although early observations are highly promising, Dr. Grayston stated that at least another year will be required before the tests can be completely evaluated.

The importance of the NAMRU studies was emphasized by a world health authority who said recently, "Should these tests prove successful, and the vaccine now being used found capable of preventing the disease and curing young persons afflicted with it, one of the foremost achievements in the medical history of the world will have been recorded."

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#### Navy Mutual Aid Terminal Dividend Now \$2000

The Board of Directors of Navy Mutual Aid Association on 24 November 1959 voted to pay a \$2,000 terminal dividend to the designated beneficiary of any member whose death shall occur after 1200 EST on 24 November 1959. This dividend is payable on a member's death in cash or as annuity. Total death benefit is now \$9,500. Paid-up memberships of less than \$7,500, terminated by death, will be increased by 26 and 2/3%. This dividend does not increase loan or surrender values of memberships.

This action by the Board of Directors is the fourth increase in terminal dividend since 1954. It was made with approval of competent actuarial authorities after review of the Association's earnings and general financial condition.

The current year has been one of outstanding achievement. In August the Association attained its goal of \$200,000,000 protection in force and assets now exceed \$43,000,000. The Association is in a stronger financial position than ever in the past to accomplish its purpose of providing the greatest amount of insurance at the least possible cost.

Officers wishing additional information should address their inquiries to the Navy Mutual Aid Association, Navy Department, Washington 25, D. C.

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A Letter to the Surgeon General

On the occasion of his recent departure from a visit to the United States, Major General P.V. Somer, The Surgeon General of the Finnish Defense Forces, addressed the following letter to Rear Admiral B.W. Hogan, Surgeon General of the United States Navy:

"Dear Admiral:

My pleasant duty before my departure from the United States is to express my deeply felt gratitude to you and the members of the Navy's medical staff for the kindness, help, and interest manifested to me during my tour.

The visits to the Medical Center of the United States Navy in Bethesda, to the Naval Hospital of San Diego, and to the Underwater Demolition Unit have greatly added to my knowledge and greatly increased my perspectives of the field of medicine during times of peace as well as times of war. The courtesy and kindness of everyone I encountered on my tour have made it a memorable one.

During my visits, I noticed the high standards of all Navy medical installations and, also, the devotion with which everyone works in his individual tasks.

Please accept, Admiral, the assurance of my deepest gratitude and best wishes for your personal health and success in each task.

Very sincerely yours,

/s/

P.V. Somer"

Military Immunization - New Film Release

Two new Navy films on military immunization which reflect current triservice regulations and practices are now being distributed. They are: MN-8568-a, "Military Immunization - General Procedures," and MN-8568-b, "Military Immunization - Smallpox Vaccination."

The first, on general procedures, shows all the carefully planned steps in a system by which a small team of medical personnel can immunize large groups of men quickly, but with no compromise of the highest standards of medical practice. The procedure is adaptable to any mass-immunization requirement, such as a roundup where immunization of all personnel on a base are brought up to date, an operation where injections are given to an entire ship's company with minimum interruption of ship's work, or the fast and safe immunization of hundreds of men at a recruit training center. Emphasis is on the detailed planning and organization by the medical officer in charge, which is essential to both speed and smoothness of the procedure and safety of the patients. This film, 23 minutes in length, is in black and white.

The second film shows proper procedures for smallpox vaccination and for observing and recording its various effects. Particular instruction is given in storage and handling of vaccine, cleansing the site of vaccination with soap and water and then acetone, use of multiple-pressure technique, and recognition of primary, immediate, and accelerated reactions. Use of slow-motion photography in demonstration of multiple pressure, and of extremely large close-ups of several typical reactions especially recommend this film as an aid to training of medical personnel who are responsible for immunization either of individuals or of large numbers of men. The film is 12 minutes long and is in color.

Prints of these films are being distributed to the Navy's Preventive Medicine Units in addition to the standard distribution list of hospitals and Naval District libraries. If prints are not available through the usual source, address inquiry to the Film Distribution Unit, Training Division, Bureau of Naval Personnel, Department of the Navy, Washington 25, D. C.

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Directives

From time to time, attention is invited to directives that are of significant general concern. For economy of space, they are described only by number, date, subject, and statement of purpose. Directives may be studied in detail from the complete copy which usually may be obtained at the Administrative or Personnel Office. When not available locally, copies of BuMed Directives may be obtained from Navy Supply Center, Oakland, Calif., or Norfolk, Va., or Naval Weapons Plant, Washington, D. C.

BUMED INSTRUCTION 5100.1B

24 November 1959

Subj: Code for Use of Flammable Anesthetics (Safe Practice for Hospital Operating Rooms)

This instruction directs attention to ignition hazards of flammable mixtures of combustible anesthetic agents, and to measures applicable in reduction and control of these hazards.

BUMED INSTRUCTION 6320.22A

24 November 1959

Subj: Dependents' Medical Care in Civilian Facilities in Areas Other than United States and Puerto Rico; payment of charges for

This instruction provides procedures for payment of authorized medical care for spouses and children of active duty Navy and Marine Corps personnel from civilian physicians and in civilian medical facilities in areas other than the United States and Puerto Rico; and supersedes BuMed Instruction 6320.22.

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Recent Research Reports

Naval Medical Research Unit No. 3 (Cairo, Egypt), Navy #540 c/o FPO, N. Y., N. Y.

1. The Gerbils of Egypt. NM 52 08 03.0.05, December 1958.
2. Sexual Dimorphism in Coloration in the Viper Cerastes Vipera L. NM 52 08 03.7.03, December 1958.
3. The Mustelids of Egypt. NM 52 08 03.7.06, December 1958.
4. The Biochemistry of Henna. NM 72 01 03.5.2, August 1959.
5. Cardiopulmonary Studies in Schistosomiasis - Pulmonary Function in the Normal Egyptian Males. NM 72 01 03.4.06, September 1959.

Naval Dental Research Facility, U.S. Naval Training Center, Great Lakes, Ill.

1. Rate of Flow of Parotid Secretion. NM 75 03 27, October 1959.

Naval Medical Research Unit No. 4, Naval Training Center, Great Lakes, Ill.

1. Intracutaneous and Subcutaneous Asian Influenza Virus Vaccination Studies. NM 52 05 04.5.1, 26 January 1959.

Aviation Medical Acceleration Laboratory, Naval Air Development Center, Johnsville, Pa.

1. A Physiological End Point for Study of the Tolerance of Small Mammals to High Acceleration Stress. NM 00 02 12.15, Report No. 1. 17 June 1959.



2. A Stable Continuously Recording Electrode System for the Determination of Oxygen Dissolved in Protein Solutions. NM 11 01 12.7, Report No. 7 20 July 1959.
3. Relationships between Semicircular Canal Function and Otolith Organ Function. NM 17 01 12.1, Report No. 8, 8 September 1959.
4. Production of Pain and Thermal Burns in Skin Areas Previously Exposed to Ultraviolet Radiation. NM 19 01 12.1, Report No. 19, 21 September 1959.

Naval Medical Field Research Laboratory, Marine Barracks, Camp Lejeune, N. C.

1. Treatment of Severe Thermal Burns with Digoxin and Intravenous Fluids. NM 61 01 09.1.11, September 1959.
2. A Breath-Holding Test: A Preliminary Investigation of Its Psychometric Usefulness. NM 18 01 09.1.2, October 1959.

Naval Medical Research Laboratory, U.S. Naval Submarine Base, New London, Conn.

1. Comparison of Scotopic, Mesopic, and Photopic Spectral Sensitivity Curves. Report No. 295. NM 22 01 20.01.04, 10 March 1958.
2. Relationship between Stimulus Size and Threshold Intensity in the Fovea Measured at Four Exposure Times. Report No. 297. NM 22 01 20.01.06, 8 June 1958.
3. Brief Tone Audiometry - Temporal Integration in the Hypacusic. Report No. 298. NM 22 01 20.03.03, 15 June 1958.
4. Relationships between Submarine School Performance and Scores on the Navy Thematic Apperception Test. Report No. 301. NM 23 02 20.01.04, 1 October 1958.
5. Exploratory Study of the Efficacy of Dioctyl Sodium Sulfosuccinate (Colace) in the Control of Constipation of Submariners during a Prolonged Snorkel Cruise. Report No. 305. NM 24 01 20.04.04, 15 December 1958.
6. Standardization of a Scotopic Sensitivity Test. Report No. 308. NM 23 01 20.04.03, 17 March 1959.
7. Identification of Signal Lights: I. Blue, Green, White, and Purple. II. Elimination of the Purple Category. Report No. 310. NM 22 02 20.03.01, 22 May 1959.
8. Survey of the Lighting Installation in the USS TUSK (SS-426). Memorandum Report No. 59-3. NM 22 02 20.01.05, 2 June 1959.
9. Studies of Basic Cochlear Physiology and the Energy Metabolism of the Cochlear Response in the Cat. Report No. 311. NM 24 01 20.02.02, 16 June 1959.
10. Combined Ventilatory and Breath-Holding Evaluation of Sensitivity to Respiratory Gases. Report No. 315. NM 24 02 20.01.02, 20 July 1959.

11. Predicting Submarine School Attrition from the Minnesota Multiphasic Personality Inventory. Report No. 313. NM 23 02 20.01.06, 20 August 1959.
12. Effect of Test Stimulus on the Measurement of Dark Adaptation. Report No. 318. NM 22 01 20.01.08, 8 September 1959.

Naval Mine Defense Laboratory, Panama City, Fla.

1. The Explosive Decompression Component of Air Blast. NM 64 01 23, June 1959.

Naval School of Aviation Medicine, NAS, Pensacola, Fla.

1. Listener Reception - The Effects of: Part I. Diotic and Dichotic Peak Clipping. Part II. Reintroducing Selective Filtering at Various Interruption Rates. Part III. Specified Amounts of Peak Clipping. Report No. 82, Subtask No. 1. NM 18 02 99, 5 January 1959.
2. Idiopathic Orthostatic Hypotension and Its Relationship to Positive G Tolerance. Report No. 13, Subtask No. 1. NM 11 01 11, 21 May 1959.
3. Time Required for Detection of Stationary and Moving Objects as a Function of Size in Homogeneous and Partially Structured Visual Fields. Report No. 15, NM 17 10 99, 26 May 1959.
4. Evaluation of Certain Visual and Related Tests: VI. Special Phoria Tests. Report No. 7, Subtask No. 6. NM 14 01 11, 7 July 1959.

U.S. Navy Medical Research Unit No. 2 (Taipei, Taiwan), APO 63, San Francisco, Calif.

1. Treatment of Cholera. NM 52 11 02.3.4, 1 August 1959.
2. Trematode Parasites of Vertebrates of East Pakistan. NM 52 15 02.1.6, 21 August 1959.
3. Adenovirus Infections in Chinese Army Recruits on Taiwan. NM 52 05 02 .10.3, 12 October 1959.

(To be continued in an early issue)

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From the Note Book

Cystic Fibrosis. Although estimates of the number of patients discharged from hospitals with a diagnosis of cystic fibrosis are probably far short of the prevalence of the disease in the general population, the fact that in one year 2,500 persons were hospitalized and that one out of every 6 or 7 was discharged by death affords a striking picture of the seriousness of this disease. (M.G. Sirken, Ph. D., et al, Pub. Health Rep., September 1959)

Cerebrovascular Disease - Stroke Syndrome. Considering that periodic evaluation of the methods of diagnosis and results of treatment is essential to a better understanding of the problems being faced in patients with cerebrovascular disease, the authors present a review of the problem with current methods of diagnostic evaluation. (Gurdjian, E.S., et al, J. Nerv. and Ment. Dis., September 1959)

Indications for Common Duct Exploration. Absolute indications: palpable stones, jaundice, pancreatitis, x-ray evidence of stones in common duct. Relative indications: dilated common duct, small stones in gallbladder, high epigastric or subxiphoid pain, aspiration of turbid bile from common duct. Presence of two or more relative indications usually indicate exploration. (A. Smith, M. Wilhelm, Am. J. Surg., October 1959)

Erythropoietic Principle of Kidney. By means of experiments in mice, the author has demonstrated that the kidney produces a principle of importance in erythropoiesis differing from erythropoietin. Observations incident to experiments indicated that erythropoietin is produced in the liver. (Sverre Osnes, University of Oslo, Brit. M. J., October 1959)

Giant Hypertrophic Gastritis. Reviewing the literature and discussing six cases of their own, the authors conclude that this condition which presents a clinical picture sometimes similar to peptic ulcer disease, is not as rare as frequently considered. Clinical and laboratory studies usually result in a diagnosis of malignancy with gastric biopsy required to establish the correct pathologic condition. (J. Moran, J. Beal, Am. J. Surg., October 1959)

Fibrocystic Disease of Breast and Carcinoma. Reviewing 876 patients with mammary gland lesions, the incidence of coexisting fibrocystic disease and carcinoma was found to be 3.1% which was not considered supportive evidence for the theory that fibrocystic disease is precancerous. (J. Hodge, et al, A.M.A. Arch. Surg., October 1959)

Latex Test. Applying the latex test to serum and to an euglobulin fraction of the serum of some healthy subjects, some patients with various rheumatic disorders, and some with nonrheumatic diseases, the author concludes that the test appears to be at least as accurate in the diagnosis of rheumatoid arthritis as the sheep cell techniques and has some technical advantages. (M.R. Jeffrey, J. Lab. & Clin. Med., October 1959)

Mediastinoscopy. At the Clinic of Thoracic Surgery, Stockholm, Sweden, the author sought a procedure that was simpler for the patient than thoracotomy to determine the extent to which mediastinal disease might be caused by malignancy. The technique of mediastinoscopy devised and performed in over 100



cases without complication is presented. (Eric Carlens, Dis. Chest, October 1959)

Abdominal Crisis Pain. When short term cyclic episodes of constant and widespread abdominal pain are not influenced by eating, defacating, or expelling flatus, it is probably of central origin. A hysterical element is sometimes observed in this syndrome which also may be a migraine or epilepsy component. (Walter Alvarez, Postgrad. Med., October 1959)

Daytime Sedatives. Evaluating many sedatives commonly employed for daytime sedation as well as nocturnal hypnosis, the findings of the authors indicated that butabarbital sodium provided the highest rating of therapeutic index. (R. Batterman, et al., Postgrad. Med., October 1959)

Rheumatoid Arthritis and Heart Disease. A case report and brief review of the literature of concurrence of rheumatoid spondylitis and heart disease is presented, adding to the growing list of such reported occurrences. The common triad is: (1) rheumatoid ankylosing spondylitis, (2) inflammation of the aortic valve and scarring of the pericardium, and (3) conduction defect (atrio-ventricular nodal or bundle branch block, or both). (G. Burch, G. Malaret, Am. J. Med. Sci., October 1959)

Malignant Melanoma. Isolation and perfusion with cancericidal drugs in the experience of the authors has yielded encouraging results in treatment of malignant melanoma of the extremities. This technique allows less radical surgery than is customarily considered mandatory. (R. Ryan, et al, Plast. and Reconstruct. Surg., October 1959)

Prothrombin Time. A method is described for estimation of the prothrombin time of capillary blood obtained by finger puncture with results being available within 2 minutes. This procedure is considered to be particularly suitable and desirable for management of out-patients on continued anticoagulant therapy. (R. MacMillan, D. Watt, Am. J. Med. Sci., October 1959)

Myocardial Infarction in Portal Cirrhosis. Reviewing autopsies for a 20-year period, the authors presented results that indicate that individuals with portal cirrhosis suffer fatal coronary occlusion with myocardial infarction less frequently than do noncirrhotics. Factors involved in this coincidence are discussed. (W. Grant, et al, Ann. Int. Med., October 1959)

Pulmonary Blastomycosis. A series of 35 patients with blastomycosis were reviewed with particular attention to 27 individuals who had pulmonary involvement. Clinical features of this disease are discussed with case histories representing various aspects of the problem. (R. Abernathy, Ann. Int. Med., October 1959)

**DENTAL****SECTION**Twelfth Anniversary of Dental Rating

Following is an open letter from RADM C. W. Schantz, Assistant Chief of the Bureau of Medicine and Surgery (Dentistry) and Chief of Dental Division, to all Dental Technicians upon the occasion of the 12th anniversary of establishment of the Rating Group, XI, Dental.

"It is a pleasure for me as Assistant Chief of the Bureau of Medicine and Surgery (Dentistry) and Chief of the Dental Division, to extend hearty congratulations and best wishes to every Dental Technician on the twelfth anniversary of the establishment of the Dental Rating.

The rating Group XI, Dental, was established in December 1947 by the Chief of Naval Personnel, with the approval of the Secretary of the Navy. In April 1948, the ratings of Hospital Corpsmen who were already qualified as Dental Technicians were changed to the Dental Rating as Dental Apprentice, Dentalman, or Dental Technician. At the present time approximately 2,750 Dental Technicians are serving in more than 400 Navy and Marine Corps activities, afloat and ashore.

Through their skillful and intelligent performance of duty, Dental Technicians contribute greatly to the high standards of dental care provided by officers of the U.S. Navy Dental Corps. In supporting the actions of units to which attached, Dental Technicians have displayed heroism and exceptional devotion to duty. This was particularly true during the Korean conflict when twenty Dental Technicians, serving with the First Marine Division, won awards which included the Navy Cross, Silver Star, and Bronze Star.

I am happy to report at the time of this anniversary that reenlistment rates are increasing and that opportunity for advancement is improving. On behalf of the Navy Dental Corps, I say to each Dental Technician,  
'Well Done!'

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Reduced Lactobacilli Count Due to  
Elimination of Caries

Five male persons—average age 24 years—were selected for this study. Each subject had at least ten carious lesions and exhibited an extremely high salivary lactobacillus count. For each individual, two pre-treatment lactobacilli counts were taken (tomato juice agar) on successive days. The average count for the group was 98,000 colonies/ml. of saliva. All carious lesions were then eliminated and the cavities filled with amalgam and silicate cement. Lactobacilli counts were subsequently made on the week following and at monthly intervals for 14 months. Three of five individuals exhibited zero counts throughout the 14-month postoperative period. The remaining two subjects attained counts below 2,000 within the first month and frequently exhibited zero counts during the period of observation. All carious lesions of an additional ten cases with rampant caries, average age 18 years, were filled with zinc oxide and eugenol cement. These persons exhibited an average lactobacillus count of 132,000 for three successive pre-treatment counts. Post-treatment counts were made at weekly intervals for 4 weeks. Seven of the ten subjects showed a zero count during the first postoperative week and continued at this level during the 4-week period. The remaining three consistently exhibited high counts for 4 weeks, but in these cases newly formed carious lesions occurred and decalcified areas were observed. These findings confirm a previous study wherein precipitous drops in lactobacilli counts occurred in 39 individuals after a full mouth rehabilitation. (I. L. Shklair, H. R. Englander, K. C. Hoerman, Dental Research Facility, NTC, Great Lakes, Ill.: Abstract, 35th General Meeting, International Association for Dental Research, March 1957)

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The Nature of Discipline

Discipline is not synonymous solely with punishment, as many people believe. The word comes from the Latin noun disciplina which means "teaching." That is the chief objective of discipline within the Dental Corps, for a well-disciplined Naval unit responds automatically and without panic in an emergency.

Discipline is defined as "control gained by enforcing obedience or order, as in a school or army; hence, orderly conduct; as, troops noted for their discipline." Again, discipline can be defined as "training or a course of training that corrects, molds, strengthens, or perfects." The Dental officer has no choice: He is responsible to higher authority for the conduct and appearance of his subordinates; in other words, he is responsible for their discipline.

The purpose of discipline is to coordinate human actions under leadership for attainment of a common goal. Effective discipline demands that each individual fit into the over-all organization.



Human experience has proved the necessity of discipline whenever people work together to realize any aim. The need for a set of rules and for adherence to rules is demonstrated not only by executive orders and by laws recorded in writing by legislatures, but by unwritten laws, sanctioned by customs and usage, called conventions. Each member of the group profits by belonging; in turn, each member must conform to rules governing relations between individuals that have been set up by duly constituted authority.

Effects of discipline are encountered everywhere. A citizen cannot go from his home to work without traveling over streets built by means of tax moneys levied upon him and others, controlled by traffic lights aimed to keep traffic moving safely, and policed by his agents. The law-abiding person contributes to, and gains from, these and other orderly arrangements for group living. He must likewise learn and accept the laws of nature. The well-adjusted man, in the Navy or out, is he who has a healthy concept of discipline.

Following a recent study, ADM Arleigh Burke USN stated: "A well-disciplined organization is one whose members work with enthusiasm, willingness, and zest, both as individuals and as a group, to fulfill the mission of the organization with expectations of success." The signs of discipline are a smart salute, proper wearing of the uniform, and prompt and efficient action in an emergency and in battle.

Several theories are offered for securing and maintaining discipline: preventive theory, based on an extensive planned welfare and recreation program; punishment theory, based upon the fear of the consequences of violating rules and regulations; and the reward theory.

Men's actions are controlled largely by one of two motives: fear of punishment or hope of reward. Although hope of reward is the more desirable stimulus, having as its results greater efficiency and harmony, fear of punishment cannot be entirely dispensed with. Punishment cannot be entirely dispensed with because in certain cases it can be used to obtain immediate results. The Navy cannot permit a man to become a habitual offender. Punishment, judiciously awarded, can salvage a man; but punishment, unjustly or erratically administered, can destroy a man. Before taking any disciplinary action it is wise for the Dental officer to verify all facts, to completely evaluate the situation. Such offenses as gross disrespect for authority, willful disobedience, and sleeping on watch must be punished swiftly, impartially, and sternly. Because of the effect on other men, it is particularly important that penalties follow soon after the offense.

It should be remembered that men kept in constant fear of arbitrary punishment lose the initiative and resourcefulness necessary in a modern navy. Some primitive leaders (and a few modern ones with primitive tendencies) have practiced the custom of having a follower liquidated occasionally just to keep the remainder in line. This philosophy of keeping men in line through fear is currently in bad repute; there is no place for it in an organization requiring the good will and high morale of its personnel. Men should be

aware of the punishment that will surely be administered if they transgress, but should be so confident of their training and should take such pride in their skills and in the good name of their unit that they need not feel the pressure of fear.

To build up a high state of positive discipline is to provide an environment for excellence in performance; good work in turn produces high morale. On the other hand, negative discipline can be a strong factor—but it must be used with great care.

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### Continuous Training Program

A short postgraduate course in Periodontics will be presented at the U.S. Naval Dental School, NNMCMC, Bethesda, Md., on 29 February through 4 March 1960, and 2 May through 6 May 1960. This course will consist of lectures, discussions, and clinical demonstrations. Emphasis will be placed on a practical approach to eliminating the periodontal pocket, tissue changes in occlusal trauma, and systemic aspects of periodontal disease. Surgical procedures will be reviewed.

CDR P. C. Alexander DC USN, Diplomate, American Board of Periodontology, will be instructor for the course. Quotas have been assigned to the following Naval Districts and Commands: 1st, 3rd, 5th, 6th, 9th, PRNC, SRNC, and CNATRA.

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### Newly Standardized Dental Item

It has been determined through use that FSN 6520-531-0500, although cataloged as suitable for fabrication of both maxillary and mandibular dentures, is suitable only for maxillary dentures. Identification for this item is currently being modified to reflect its correct use. The following new item is available for use in fabricating mandibular dentures:

<u>Stock No.</u>	<u>Item Identification</u>	<u>Unit of Issue</u>	<u>Unit Price</u>
6520-559-9935	FLASK, DENTURE, Ejector Type: (Hanau Type). For use in processing of lower cases. For "C" clamp requisition 6520-299-8025; for press requisition 6520-515-5150; for ejector requisition 6520-531-0600; for clamp and ejector requisition 6520-550-2900.	Each	\$6.50

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### Professional Meetings

Gold Foil Study Club. A gold foil study club, known as "The Great Lakes Gold Foil Seminar," has been organized at the U. S. Naval Training Center, Great Lakes, Ill. The club with twenty charter members will meet semi-monthly. Among subjects to be discussed will be methods of improving operative proficiency through improved utilization of dental assistants.

LT Arthur G. McDonnell DC USNR was elected President of the club.

Portsmouth Dental Society. Dental officers of the Norfolk Naval Shipyard, Portsmouth, Va., recently acted as hosts to civilian dentists of the Portsmouth Dental Society. The meeting was held at the Commissioned Officers Mess (Open) in the Shipyard. A "Welcome Aboard" was presented by the Senior Dental Officer, CAPT F.I. Gonzales, Jr., DC USN, and was followed by a short business meeting of the society. The group then adjourned to the Shipyard Dental Clinic where a program of specialized dentistry was presented by CAPT A.L. Teitel DC USN, CDR S.T. Elder DC USN, and LCDR W.J. Jasper DC USN.

British Dental Association. CDR E.R. Bernhausen DC USN recently presented a paper, "Partial Denture Planning," before the British Dental Association (East of Scotland Branch) in Edinburgh, Scotland. CDR Bernhausen emphasized the importance of proper denture design.

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### Obituary

CAPT John R. McIntyre DC USN (Ret) died on 2 November 1959. CAPT McIntyre was born in Washington, D. C., and graduated from Georgetown University in June 1928. He reported for his first tour of active duty to the U. S. Naval Training Station, Newport, R.I., in November 1941. Among the many ships and stations on board which CAPT McIntyre served were: USS KENMORE, USS WRIGHT, USS SAN CLEMENTE, and USS VALLEY FORGE. In December 1955, while on duty at the Marine Corps Air Station, El Toro, Calif., CAPT McIntyre was placed on the Temporary Disability Retired List of the Navy.

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### Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date



items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

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## RESERVE



## SECTION

### Criteria for Earning Promotion Point Credits

#### Active Duty for Training, Appropriate Duty, Drill Participation

1. Twelve promotion points are creditable for each fiscal year since 30 June 1949 in which participation in present grade in the Naval Reserve was at the following minimum levels:

a. Fiscal Year 1961 and Subsequently (Effective 1 July 1960). Points are creditable for meeting the participation requirement of either subparagraph (1) or (2) below:

- (1) Completion of 14 days' active duty or active duty for training, or
- (2) Attendance at 75% of the drills authorized for the unit or units in which enrolled; or completion of 75% of the periods of appropriate duty authorized, but in no case less than 18 drills or periods of appropriate duty as appropriate.

(a) Drills attended as an instructor in a Naval Reserve Officer School are included. Drills attended as a student in Naval Reserve Officer School are not included.

(b) The number of drills authorized or periods of appropriate duty authorized are those numbers approved by the cognizant commandant or overseas commander and are within the limits set forth in the tables of organization of the Naval Reserve.

(c) The number of drills attended is the total number reported on Quarterly Naval Reserve Drill Reports (NavPers 1259).

(d) The number of periods of appropriate duty completed is the total number reported to, and approved by, the commandant.

(e) In the case of a drilling unit, an officer's percentage of attendance is determined by dividing the total number of drills attended by the total number of drills authorized. If an officer is enrolled in more than one unit during a year, the divisor in this computation is the number of drills authorized for the unit having the least number of drills.

(f) In the case of appropriate duty, an officer's percentage of attendance is determined by dividing the total number of appropriate duty periods completed by the total number authorized.

(g) In the case of dual status in which an officer participates both in a drilling unit and under appropriate duty orders, the drills attended and drills authorized in the drilling unit govern, and computation is in accordance with subparagraph 1a(2) (e) above.

b. Fiscal Years 1958 and 1959 (1 July 1957 through 30 June 1960). Minimum participation requirements were the same as in subparagraph 1a above, except for the following:

(1) Appropriate duty is considered in the same category as active duty or active duty for training.

(2) The minimum number of periods is 14 instead of 18.

c. Fiscal Years 1956 and 1957 (1 July 1955 through 30 June 1957). Minimum participation requirements were the same as in subparagraph 1a above, except for the following:

(1) The minimum number of drills was 12 instead of 18.

(2) Drills attended as either an instructor or a student in a Naval Reserve Officer School course were included in drill attendance.

(3) The provisions of subparagraph 1b apply.

d. Fiscal Years 1950 through 1955 (1 July 1949 through 30 June 1955).

Completion of the requirements for a year of satisfactory Federal service through accrual of 50 retirement points, provided that at least 12 of the retirement points were earned by active duty, active duty for training, drills, or appropriate duty. For officers having anniversary years other than the fiscal year, the 12 points in fiscal year 1955 were creditable for the portion of a year between anniversary date and 30 June 1955, provided that in that period at least 50 retirement points were accrued, at least 12 of which were earned by active duty, active duty for training, drills, or appropriate duty.

### College Courses and Residency Training

1. Officers enrolled in a resident course of an accredited college or university, or Medical and Dental officers enrolled in a course of residency training approved by the Chief of the Bureau of Medicine and Surgery will, upon their application, be credited with one promotion point for each semester hour or equivalent thereof satisfactorily completed. Not more than 12 promotion points will be credited for 1 fiscal year.

a. To be creditable, courses must have been completed in present grade since 1 July 1950. For courses completed prior to 1 July 1957, promotion

points are creditable as of 1 July 1957. Courses completed in subsequent fiscal years will be creditable as of 30 June of the fiscal year in which completed.

b. "Accredited college or university" is defined as any college or university listed in the official publication of the Office of Education, Department of Health, Education, and Welfare, "Accredited Higher Institutions." The currently effective publication is "Office of Education Bulletin 1957, No. 1, Accredited Higher Institutions, 1956."

c. Courses completed at foreign universities are not creditable unless they have been accredited by an American college or university in terms of semester or quarter hours. The burden of translation of foreign credits into acceptable semester hours is placed on the individual officer. Translation can be effected by the registrar of an accredited college or university, or by the U.S. Office of Education.

d. Credits granted in terms of quarter hours will be converted to semester hours by multiplying by two-thirds. Any system of credits that is not readily transferable to semester hours will be referred to the Chief of Naval Personnel for adjudication.

e. Requests for promotion credit for college or university courses will be made by the individual officer to the Officer in Charge, Reserve Officer Recording Activity, forwarded via the command holding the officer's service record. The request must be accompanied by a transcript of credits from the college or university. The command holding the officer's service record will evaluate the transcript and, by endorsement, certify the number of promotion points (not to exceed 12) assigned for each fiscal year. The transcript will be retained by the command holding the officer's service record. In case of doubt as to proper credit, the command holding the officer's service record will forward the request to the Chief of Naval Personnel.

f. Requests for promotion credit by doctors or dentists who have completed residency training will be made by the individual officer to the Officer in Charge, Reserve Officer Recording Activity, forwarded via the Chief, Bureau of Medicine and Surgery. The request must be accompanied by a certification from the institution in which training was taken as to the type of residency training and the inclusive periods in which enrolled. The Chief, Bureau of Medicine and Surgery, will evaluate the training and, by endorsement, certify the number of promotion points (not to exceed 12) assigned for each fiscal year.

For additional information concerning promotion point credit consult BuPers Instruction 1416.4C.

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## AVIATION MEDICINE DIVISION



### Flight Fatigue

Following is a report by LT R. L. Brisbin MC USNR, Airborne Early Warning Squadron TWELVE, Flight Surgeon for flight crew members in AEWWINGPAC to inform them of areas where they may be able to assist in lessening the problem of flight fatigue.

#### 1. Introduction

a. Fatigue, literally meaning to "waste away," is a universal experience among human beings to some degree or another. Because of its universal nature and its usual lack of serious consequences, except in extreme form, we ordinarily do not pay much attention to it; however, even in small amounts, it is of paramount importance to aviation safety and is probably one of the most critical problems in modern aviation medicine. One of the main reasons for this is that while we have made great strides in developing aircraft with increasing long range, higher performance, and greater technical complexity, we have not paralleled these strides in the understanding of our human machines. So we must examine closely what is known about human fatigue, attempt to apply it to our own operation, and then actively prevent it wherever and whenever possible.

b. Fatigue means many things to many people. To the physiologist it may mean the failure of a tissue to respond after repeated stimulation; to the metallurgist or engineer it may mean the failure of metal in a structural member or moving part following long use (or abuse). To us in aviation it may be best defined as: a stress response, primarily dependent only on the sheer duration of an activity, augmented by physical or purely psychic and emotional stresses. There are three major types of human fatigue with which we are concerned: physical fatigue, chronic fatigue, and skill or static fatigue. While I shall discuss these separately at first, I wish to emphasize at the outset that they are all interrelated and are found usually in combination rather than singly in a given individual in flight. I further wish to emphasize that the presence of any one of them may hasten the appearance of the others.

#### 2. Pure Types of Fatigue

a. Physical fatigue is that healthy, normal, muscular, and mental weariness following strenuous exercise or excitement. It is largely

physiologic in nature with relatively little psychologic component. It usually produces stimulation of the appetite and is quite conducive to relaxation. It also serves ordinarily as a warning sign that physical exertion should be discontinued so that body energy reserves may be restored. It is completely relieved by normal sleep, muscular rest, and freedom from excitement.

b. Chronic cumulative fatigue is mainly psychologic in nature. It results from the continuous strain of adjusting to stressful occupational demands, often augmented by fears of death, maiming, of "letting the outfit down." It has been shown that all men can develop this type of fatigue if the amount and duration of stress are sufficient. The reason that some men develop it (in a given operation) where others do not is because of individual differences in psychologic background, personality development, and ability to adjust to stress. If not recognized and treated at its outset it may culminate eventually in the severe psychoneurosis known as "combat fatigue," (actually a misnomer because true combat need not be involved). The predominant symptoms of this type of fatigue in pure form are: (1) tense feelings; (2) irritability; (3) frustration; (4) lassitude; (5) loss of confidence; (6) greater awareness of body discomfort; (7) depression; (8) insomnia; (9) anorexia (loss of appetite); and (10) forgetfulness.

c. The last pure form of fatigue which is seen is static or skill fatigue. It is this type of fatigue which forms the largest segment of flying fatigue and is also the most dangerous from the standpoint of aviation safety. It occurs in aviation personnel even in the presence of an outstanding physical condition and above average psychologic stability. Its main causes are common in all flying to some degree, and are: (1) boredom; (2) prolonged concentration; (3) attention to details, especially when associated with responsibility; (4) physical discomfort, i. e., sitting in one place for prolonged periods; (5) need for constant alertness; (6) mild hypoxia (oxygen lack); (7) noise; and (8) vibration.

d. The reason why static fatigue is so dangerous is because of its insidious onset, its marked, if transient, effect on mental processes rather than physiologic ones, and because the subjective sensations of fatigue are the last to appear and warn the subject. It leads to unrecognized little mistakes, which all too often can turn (and have turned) into big accidents. The effect of static fatigue may be best summed up as those of carelessness, complacency, and a progressive unconscious lowering of performance standards and motivation all out of proportion to any actual decreased capacity to perform or physiologic inadequacy. In many cases, the subject actually thinks he is performing better than usual. Controlled studies have shown the following to be the most important examples of performance or output decrement seen with static fatigue; (1) need for larger than usual stimuli to call forth an appropriate response; (2) errors of timing in performing tasks comprising more than one action; (3) overlooking of important elements

in a given task sequence; (4) loss of accuracy and smoothness in control column movements leading to overcontrolling and jerkiness; (5) unawareness of even gross errors in heading, altitude, attitude, and increasing susceptibility to vertigo; (6) greater unreliability of reports of what transpired during a given time; and (7) inattention, or concentration of attention to the center of vision with resultant neglect of the peripheral fields; a tendency to fix on one instrument rather than to scan all instruments.

### 3. Flight Fatigue

a. As stated earlier, all three pure types of fatigue are interdependent and combined to varying degrees in any flying situation, so that we may now speak of "flight fatigue" as a separate entity, its magnitudes of the three pure types. The occasions for the production of flight fatigue are almost endless and reach their peak in large multi-engined aircraft on long routine overwater flights, especially when flying on instruments or at night. Flight fatigue rarely lends itself to measurement in the field. Any physiologic responses or tissue impairments clearly referable to flying for long periods have, to the present, largely eluded detection. So most cases of flight fatigue, as we encounter them, will consist either of objective evidence of poor professional performance (including accidents) or of subjective experience per se by the individual airman and his purely subjective complaints of fatigue.

b. Now let us revert to the principle that some flight fatigue can be shown to exist before it is actually experienced and examine some of the known major determinants of flight fatigue and see what, if anything, we can do to combat them:

(1) Psychologic and Emotional Stress. Under this heading comes such things as boredom and monotony, responsibility, continued alertness and attention, immobility, mental activity in regard to performing one's duties, and fear. It is impossible for any barrier flight to be completely devoid of such stresses. They are inherent occupational hazards. Many things can be done by the individual, however, to minimize their effects. For one thing, it has been shown that merely to understand the existence of these stresses and to be consciously on guard against their effects will go a long way toward reducing the fatigue that they cause. Fear or anxiety, especially in respect to potential emergency situations, can be eliminated largely by thorough preplanning and rehearsal. This serves to develop overlearning and increases self-confidence. The effects of prolonged mental activity, alertness, and concentration can be partially recuperated from by such devices as light reading, simple card games, et cetera, during off watches. Immobility, boredom, and monotony can be partially combatted by getting up periodically and moving about the aircraft, or even by turning around in one's seat, stretching, looking around, et cetera. Breaking up one's routine aloft by rotating between cockpit, navigation table, engineer's panel, and even radar scope may be quite helpful to many pilots.



(2) Immobility. The need to guard against too much immobility also has its physical implications. Considerable muscular work is involved in just sitting and flying. A static type of muscle tension, especially in the postural muscles, can be quite marked. In addition, there is often interference with circulation to certain groups of muscles due to seat pressures. This leads to muscular pains, further muscle tension, and so on.

(3) Physical Discomfort. No military aircraft has ever been built, nor is one likely ever to be built, in which some degree of physical discomfort did not exist for the crew. Our WV-2 is no exception. True, it is undoubtedly less uncomfortable to fly in than other operational aircraft, but discomfort still exists no matter where in the airplane one sits for long periods of time. While the construction of the aircraft obviously cannot be changed, certain other causal factors in this physical discomfort can be.

(4) Noise and Vibration. This is a frequently overlooked cause of flight fatigue, perhaps because it is so common and we are so used to it (we think). It also may actually have a hypnotic effect in certain individuals when exposed for long periods. Little can be done to eliminate the source of it in an airplane in flight, but there is strong evidence that the wearing of ear plugs, at least when not on watch, can cut noise to where it is not nearly so fatiguing. Ear plugs are available and all medical officers and aviation medicine technician corpsmen are competent to fit them. They may be obtained by any pilot or aircrewman who would like to try them.

(5) Hypoxia. This well established cause of flight fatigue, plus decreased night vision, increased susceptibility to vertigo, et cetera, is probably not too important in our WV-2 aircraft inasmuch as cabin altitude rarely gets above 3000 feet; however, even being at 3000 feet for long periods plus heavy cigarette and cigar smoking could conceivably enhance flight fatigue in our operation. Of course, wide variations in susceptibility to this mild degree of hypoxia can be expected so that insistence on the use of oxygen on the barrier under normal conditions probably is not warranted. I would recommend that pilots and flight engineers, if they experience subjective fatigue in flight, try breathing 100% oxygen for 5 to 10 minutes out of each hour for whatever beneficial effect it might have. Naturally, rigid oxygen discipline whenever cabin pressurization is lost should be insisted upon and periodically reviewed by all pilots and flight engineers especially.

(6) In-Flight Feeding. We all know how important proper food intake is from the biologic standpoint, but other and most important values of food, especially in flight, are emotional and social, and we must be aware of these too. Improper food intake, especially when associated with the other determinants of fatigue, can have a markedly adverse effect on flying safety. This is because flying for long periods tends to deplete the body's physiologic reserves, especially sugar, and these reserves must be kept intact

for best performance to occur. From an emotional point of view, the aircraft environment may adversely affect the palatability of food and the desire for it, and may thereby create dietary dissatisfactions which lead to improper food intake, regardless of the nutritional and caloric adequacy of the food which is available. In addition, the emotional value of food is very important on extended flights to enhance morale, relieve tension, ease boredom, and counteract stress.

(a) In general, emphasis should be placed on the serving of protein rich foods, such as meat, milk, eggs, and cheese because these foods create more prolonged, if more slowly developing, high levels of blood sugar; however, high sugar content foods, such as candy, cookies, and various pastries should be readily available on all flights not only for their almost universal taste appeal and because utensils are not necessary to prepare and consume them aboard the aircraft, but also because of the rapidity with which their energy content is available—this constitutes the well known "sugar whip" concept. Smaller and more frequent meals are less likely to cause fatigue and drowsiness than large heavy meals.

(7) Morale and Motivation. Morale properly belongs under the heading of psychologic stress, but is so important as a determinant of fatigue as to warrant special consideration. An airman's morale and motivation are key factors in his resistance to fatigue. This is true both as regards individual morale and group morale. Morale and motivation are not rigid quantities which either are there or not. They can be changed in an individual or a group either for the better or for the worse. Where motivation and morale are lacking they may be improved by clarifying goals and keeping personnel informed of progress toward those goals; by the use of various awards and privileges in return for good performance; by maintaining group morale at high levels by every reasonable means; by providing variety and change where monotony tends to exist, et cetera.

(8) Dehydration. The subject of dehydration, which has been shown to contribute to flight fatigue and discomfort, properly belongs here. The usual conditions of temperature and relative humidity to which personnel are exposed for long periods in our aircraft can easily lead to dehydration and, unfortunately, the degree of a man's thirst does not always parallel his fluid needs. The use of coffee alone to replace lost fluids will not work since coffee acts as a mild diuretic and actually will cause a negative fluid balance to develop. The drinking fluids taken aloft should always be readily accessible, widely varied, and highly acceptable, and I recommend that one cup of some other fluid be consumed for every two to three cups of coffee. An excellent hot drink substitute for coffee is instant hot chocolate which can be obtained in single service packets and has the added advantage of its high sugar content.

#### 4. Between Flight Preventive Measures

a. To recognize and prevent fatigue which occurs in flight is only a halfway measure if the pilot or crewman turns to at preflight time with any backlog of fatigue from previous flights or from on-deck activities. The responsibility for preventing such a backlog is two-fold—that of the individual airman and that of command.

b. The individual's job is mainly to maintain himself in the best possible physical and mental condition with the help of his family, friends, and flight surgeon. Good habits should be cultivated so that meals are properly balanced in quality and quantity. All aviators know that they are supposed to eat a good breakfast, but what many barrier aviators forget is that breakfast for them is any meal just prior to beginning the day's work (i. e. barrier flying), whether this be at 0600, 1500, 2400, et cetera. The practice of substituting doughnuts and coffee, or a peanut butter sandwich, et cetera, for a more well balanced meal prior to flying is to be condemned soundly.

c. Sleep and relaxation between flights is critical. All of us differ in our need for sleep, but at least 8 hours of sound refreshing sleep in each 24 hours is probably the minimum that we need to be at peak performance. Even a slight reduction in the amount of sleep (e. g. 25 to 50%) can induce significant mental impairment without any subjective feelings or physical clues. Every attempt should be made to sleep or at least to nap just prior to going out for preflight because the longer the interval from awakening to starting a task, the greater the fatigue potential that exists.

d. Moderation in the use of alcohol and tobacco is axiomatic for the prevention of in-flight fatigue. Impairment from the use of alcohol, again, is all out of proportion to how a person feels subjectively. The existing rule of abstinence from beer and liquor for at least 12 hours prior to take-off is an excellent one. It should be enforced rigidly by all plane commanders for themselves as well as for their crews.

e. Since an airman's occupation is largely sedentary, he requires a moderate amount of intelligently planned physical exercise for the maintenance of peak physical condition and fatigue resistance; however, I recommend that a good night's sleep intervene between any physical recreation and flying lest a backlog of fatigue be taken aloft.

#### 5. Summary and Conclusions

a. We have seen how, because of its very nature, barrier flying must always be fatiguing to some degree, but not necessarily to the point of hazard and inefficiency if (1) we can produce a vigorous effort at all levels for the prevention and elimination of those things which tend to produce a backlog and accumulation of fatigue; and (2) we can conduct an educational program directed at reducing to a minimum the determinants and effects of fatigue secondary to flying per se.



b. This report has been prepared using most of the available reliable literature on the subject of flight fatigue plus many personal observations made during barrier flying. It is by no means complete. We have much to learn on the subject of flight fatigue and it is hoped that, by continuing observations in our own operation, plus using the observations of others in aviation medicine and aviation safety, we will be able to supplement substantially what has already been said in this report. Flight fatigue unquestionably represents a substantial aeromedical problem in AEWWINGPAC. How well we can come to understand it and to handle it will determine without a doubt our future performance record and our future safety record.

#### 6. References

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- f. U.S. Navy Medical News Letter, Vol. 30, No. 12,  
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- g. U.S. Navy Medical News Letter, Vol. 31, No. 12,  
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- h. U.S. Naval Air Development Center Research Report  
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- i. Armstrong: Principles and Practice of Aviation Medicine,  
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#### Flight Physical Examinations

Many Class 2 personnel are being ordered to specialized training, i.e., naval aviation observers, aircrewmen, parachute jumpers, et cetera, at the various training centers without a flight physical examination. This not only works a hardship on the medical facility at the training centers, but many men are found not physically qualified for training. It costs money to transfer a man. Remember you pay taxes to help pay for this useless move. The flight surgeon should see that all candidates for Class 1 or 2 aviation training receive a flight physical examination before being ordered to the training station.

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